Hans H. Ruthenberg-Graduierten-Förderpreis 2018/

Hans H. Ruthenberg Award for Graduates 2018

Bezawit Adugna Bahru "Climatic shocks, child undernutrition, and health outcomes: A quantitative analysis using the Young Lives cohort study"

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Summary

Climate change poses a serious challenge to achieve the SDG-2 of ending hunger by 2030 and leaves billions at risk of food insecurity, illness, and malnutrition. This study analyzes the longitudinal association of climatic shocks and child undernutrition using a sample of 1,980 younger cohorts (YC) and 982 older cohorts (OC) Ethiopian children drown from the Young Lives cohort study dataset. More specifically, the study estimates the impact of climatic shocks on linear growth measured in height-for-age (HAZ) and body mass index-for-age scores and stunting and underweight; the long-term impacts of climatic shocks on child undernutrition; and the pathways through which climatic shocks affect child undernutrition thereby identifying investment proprieties to tackle the negative impacts of climate change on child undernutrition.

The study employed a random intercept model to estimate the impacts of climatic shocks on linear growth as continuous outcome variables and a generalized linear model with modified Poisson regression to estimate the impacts of climatic shock on the relative risk of being stunted and underweight as binary outcome variables. Furthermore, the study used structural equation modeling techniques to estimate the long-term impacts of climatic shocks and to test the mechanisms through which climatic shocks affect child undernutrition using the UNICEF conceptual framework for undernutrition.

Three principal findings emerged from the analysis. First, controlling for child, household and community level covariates, climatic shocks are positively associated with child undernutrition and the impact of various shocks depends on age cohort. Drought was negatively associated with HAZ score of both cohorts. While frost/hailstorm was negatively associated with HAZ score of the YC, flood was negatively associated with BMI z score of the OC. Furthermore, children who were exposed to drought and flood had a higher relative risk of being stunted and underweight. More specifically, experience of drought was positively associated with the relative risk of being stunted and underweight for bath cohorts. Exposure to flood was positively associated with the relative risk of being stunted among both cohorts. Moreover, underweight among YC was further positively associated with frost/hailstorm whereas underweight among OCs was only associated with drought.

Second, early life exposure to climatic shock has a long-lasting impact on child undernutrition. In this study, climatic shocks that have occurred at round 3 and round 4 of the survey were negatively associated with HAZ score at round 4; meaning that climatic shocks that have occurred before 6-7 years have a long-lasting effect on later HAZ score. Moreover, this study revealed that children with better nutritional status at an earlier age had a better nutritional status during their later age. This could be due to persistent impact of climatic shocks on consumption as in Dercon et al. (2005) and hence decrease in linear growth which results in stunted growth later in life (fig. 1 & 2).

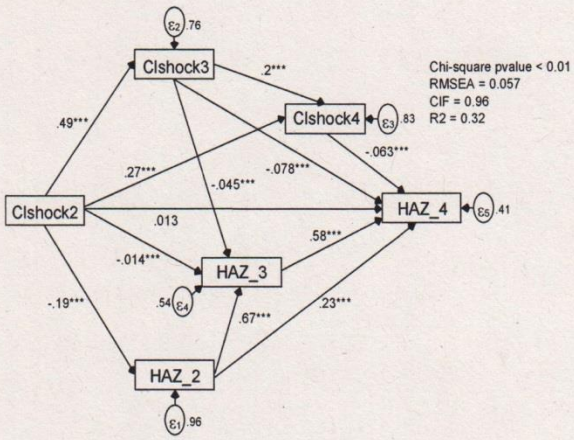

Figure 1. HAZ and climatic shock adjusted for child level covariates, YC, YL, Ethiopia

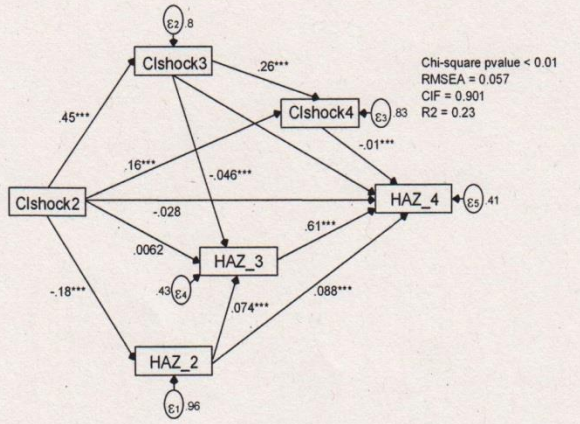

Figure 2. HAZ and climatic shock adjusted for child level covariates, YC, OL, Ethiopia

Third, the structural equation (path model analysis) showed that the association of climatic shocks with liner growth is mediated by increased food insecurity and poor environmental and service conditions which lead to lower child dietary diversity and poor child health status. More importantly, we the found effect of climatic shocks on HAZ score (YC-$ß_{FI}$ =.15, $ß_{ES}$ =.54; OC-$ß_{FI}$ =.23 $ß_{ES}$ =.73 and BMI z-score (YC-$ß_{FI}$ =.15 $ß_{ES}$ =.57; OC -$ß_{FI}$ =.21, $ß_{ES}$ =.62) are more pronounced through environment and service conditions than through its food insecurity. Given that our estimates are standardized, the higher coefficient estimate in environmental and service condition implies that programs aiming to curb the negative impacts of climatic shocks should invest more on improving environmental and service conditions in addition" to combating food insecurity. Moreover, smaller magnitude of the effect of climatic shocks on food insecurity indicates the existence of other underlying and structural factors that are associated with food insecurity in Ethiopia beyond climatic shocks.

This study also revealed the impact of other child, household, and community level determinants of child undernutrition. In this study, YCs suffered from undernutrition (both stunting and underweight) than OCs. Within the same cohort, an increase in age is associated with a decrease in the magnitude of stunting and/or underweight. Regarding gender issues, despite their biological and behavioral advantage, YC females were more likely to be stunted and underweight than their male counterparts. This might be due to the socio-cultural factors which favor boys for food buffering than girls. Gender-sensitive interventions to curb the social cultural dynamics and intra-household food distributions targeting female children might be appropriate interventions. However, the effectiveness of culturally sensitive intervention to tackle the bias within intra-household food allocation and "food buffering hypothesis" during climatic shock need further investigation.

Participation in productive safety net program had no significant impact in this study. Even

though the majority of the sample children were drawn from poor households, only 18.6 % of the YC and 14.7% of the OC households were participants of the program. Therefore, lack of statistical significance might be due to the smaller proportion of households participating in the program or self-selection bias from the participant's side. A smaller proportion of participants also partly show the lower accuracy of the program's targeting. Other studies have also reported that the program had no effect in improving child undernutrition despite its effect on food insecurity. This calls for incorporation of other determinants of nutrition beyond food security into programs through increased access to health service, clean water and sanitation, and nutrition education to improve the role of the program beyond food security. Furthermore, other determinants of food insecurity should be given equal if not more attention in such programs if the impact of climatic shocks on child undernutrition is to be dealt with.

In this study, household report of climatic shocks was positively correlated across each round, i.e. the same group of the population was recurrently affected by climatic shocks. Therefore, interventions targeting to counter the negative impact of climatic shocks should also consider diversifying the means of livelihood for recurrently affected populations. Moreover, for the most part, the cause of climate change and hence frequent occurrence of climatic shocks are human activities including increasing population size and deforestation. Therefore, disaster prevention program should take in to account population control mechanism, and increase awareness of the effect of deforestation and other unwanted activities on climate change.

As a final note, these estimates vary from other studies in target population under study, sample size and estimation power. In addition, there are differences in factors such as severity of the shock, duration of the shock, stage of the development of the child at the start of mal nutrition, household-level characteristics, etc. Therefore, lack of consistency with other studies can be partly explained due to such differences.

Reference

Bahru, B. A. (2017). Climatic shocks, child undernutrition, and health outcomes: A quantitative analysis using the young lives cohort study (Unpublished Master thesis). University of Hohenheim, Stuttgart, Germany.